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REVIEWS: Page

An International Technical Index; William Parker Cutter 17
Steam Turbines. Reviewed by Charles E. Lucke, M. Am. Soc. M. E. 18
Railway Rate Theories of the Interstate Commerce Commission 19
Primer of Sanitation for the Tropics 19
Practical Applied Electricity 19
City Government by Commission 19
Electric Light for the Farm 19
Illuminating Engineering 20
Flying Machines To-day 20
A New Idea in Sanitation 20
Chemins de fer Funiculaires Transports Aeriens 21
The Railway Library, 1910 21
The Undeveloped Field in the Life Insurance Business 21
Franchises of Electrical Corporations in Greater New York 21
Properties and Uses of Douglas Fir 21
A Manual of Engineering Drawing for Students and Draftsmen 22
Waterways as Creators of Prosperity 22
Quality of the Water Supplies of Kansas 22
Official Handbook of the Panama Canal 22
Construcciones de Hormigon Armado 22
Fire and Fire Losses 22
Elastizitaet und Festigkeit 23
Metallurgy of Tin 23
A Manual of Practical Hygiene 24
The Septic Tank 24
Vanished Arizona 24
Milwaukee Bureau of Economy and Efficiency 24
Proportional Representation 25
Farmers' Bulletins, U. S. Department of Agriculture 26
PUBLICATIONS RECEIVED 27

GENERAL ARTICLE

An International Technical Index.*

By WILLIAM PARKER CUTTER.†

The growth of the literature of the applied sciences has been phenomenal, corresponding as it has to the growth of knowledge and the progress of invention. Throughout the world the inventor, engineer, manufacturer and builder are making new discoveries, constructing new machines, developing new systems of transportation, erecting new structures, even overcoming the difficulties of aerial navigation. Their results and conclusions are given publicity in printed form, in the publications of societies, educational institutions and commercial organizations, and through the technical press.

As the printed page is the only permanent record of these achievements of technical investigators, it is of the greatest importance that the results should be easily and quickly available to students and investigators who wish to profit by the experience of others. We are to-day spending time and money in discovering facts and processes which have already been discovered; inventors are trying to perfect apparatus and processes which have already been perfected, and the engineer in the field is working on projects which are similar to those already executed. Conservation of that highest type of energy, the energy of the human mind, requires that the effort thus lost should be minimized.

An index to the literature of technology, if comprehensive, detailed, world-wide in scope, would do much to assist the progress of the world, by making readily and immediately known those discoveries, achievements, constructions and processes which we have already accomplished. It is with the object of discussing the feasibility of such an index, the organization necessary to inaugurate the undertaking, and the general principles which should be followed in the preparation of such an index, that this paper has been prepared.

In order to learn from the experience of others, we may well examine into previous international attempts to index scientific literature. The experience of the Royal Society of London, although covering the issue of an international index which has from the first expressly excluded applied science, is quite illuminating.

The first suggestion of international cooperation in the preparation of an index to scientific literature may be traced to Professor Henry of the Smithsonian Institution in Washington, who addressed a communication to the British Association for the Advancement of Science in 1855‡ containing a proposal for the publication of a catalog of philosophical memoirs scattered through the transactions of societies in Europe and America, with the offer of the cooperation on the part of the Smithsonian Institution, to the extent of preparing and publishing, in accordance with the general plan which might be adopted by the British Association, a catalog of all the American memoirs of physical science.

The General Committee of the association approved of the suggestion and recommended the appointment of a committee to consider the best system of arrangement. The committee was appointed, and reported to the association in 1856,* recommending that the catalog should be limited to the mathematical and physical sciences, leaving natural history, geology, mineralogy and chemistry to a separate catalog or catalogs. They recommended an author catalog and a subject catalog, and with reference to the latter reported as follows:

> As to the catalog according to subjects, the question of arrangement is one of great difficulty. It appears to the committee that the scheme of arrangement cannot be fixed according to any *a priori* classification of subjects, but must be determined after some progress has been made in the preliminary work of collecting the titles to the memoirs to be cataloged. The value of the catalog will materially depend upon the selection of a proper principle of arrangement, and the care and accuracy with which such principle is carried out.

By vote of the Council of the Association the report of this committee was communicated in March, 1857,† to the President and Council of the Royal Society, whose cooperation was requested. The original committee appointed by the association, with the addition of two members named by the Royal Society, made a report to the Council of the Royal Society in June, 1857. They recommended that the publication should be a "serial index," that is, a list of papers in each series of transactions, journals and other periodical works, put down in the order in which they occur in the several volumes, and that other indexes should be attached, an author's index certainly, and a subject index "if it could be done."

No further step was taken in cooperation, but acting on a report of the Library Committee of the Royal Society, that Society determined to prepare a manuscript index, the question of printing being deferred. The scope was finally broadened to cover "all science," although at that time it did not cover what we now call technology. When, in 1864, the question of the printing had to be determined, the Lords of the Treasury furnished the funds for the purpose. Parliament later voted a gift to the publication, and with the financial assistance that the Society gave, and private gifts, the eleven volumes covering the years 1800 to 1883 were published.

I desire to call especial attention to several details in the publication of this index. From the first the difficulties in the classification of subject indexes was recognized. The obligation of the Government to assist in the publication of this important undertaking was soon recognized. The undertaking became too large for any one society to continue, and international action became necessary.

The International Bibliographical Congress met at the call of the Royal Society in London in 1896, and was attended by accredited representatives of 23 governments. These unanimously agreed to compile by means of an international organization, a complete catalog of scientific literature, arranged both according to subject and by authors' names; that the material should be collected for each country by local organizations established for that purpose, the material to be edited for publication by a central international bureau, to be established in London.

The chief disagreement was as to the method to be followed in classifying the subject matter; the representatives from Belgium insisted in advocating the adoption of the Decimal Classification, but this was not favored by the majority of the delegates. At a second conference in 1898, a committee of the Royal Society reported complete schedules of classification which they had compiled, and these were adopted by the conference. Subsequent conferences have been held in London in 1900, 1905 and 1910. The agreement was that the index as issued should be divided into 17 sections, comparing with the 17 subjects selected, but unfortunately omitting the applied sciences. Each country guaranteed support both by direct contributions of funds, and by guaranteed subscriptions to a definite number of complete copies of the catalog, at a price of about $85 per annum. Some four hundred copies are thus subscribed for. The Smithsonian Institution was appointed the regional representative for the United States, and for some time this institution paid the expenses from its own funds; of later years, Congress has appropriated $5,000 annually for the local expenses. Regional bureaus exist in at least 28 countries. The catalog is still being issued, and has a wide acceptance from the scientific world. Its chief weakness is the delay in issue incident to the method of compilation, and the omission of applied science.

In the year 1908, an organization was formed in Berlin known as the Institut International für Techno-Bibliographie, to continue by private enterprise the index to technical literature which had for so long been issued by the German Patent Office under the title Repertorium der technischen Litteratur.* Since that time, regional bureaus have been established in England, Austria, Sweden, France and Germany, and I have received a proposition to establish such a bureau in the United States. This Institut has been supported in part by the sale of its index, which is issued in German, French and English editions, and partly by contributions from the German and Austrian governments and by private benefaction. The index issued by this bureau, monthly with annual cumulation, is the first really adequate and complete index that has been issued. Unfortunately, I fear that the financial organization has not been carefully worked out, and that the real work, which is being done at the German Patent Office, is too largely volunteer in character to ensure permanence. I do not believe that any index can be a permanent success unless it is either supported by appropriations from the several governments, by appropriations and contributions from the great engineering societies and corporations, or has a large private endowment.

With a view to inaugurate a movement towards the compilation and support of such an index on a truly international basis, I have suggested that the four great engineering societies of the United States appoint a committee on invitation and plan, to devise a plan for a first international congress for technical bibliography, and to issue invitations to such a congress to the representatives of all the civilized nations. There might well be added a request of attendance addressed to all of the great technical societies of the world, as well as to representatives of the great engineering firms. The expenses of such a congress might well be provided by a fee from each person present, with an additional fee from the representatives of foreign governments.

This congress might well consider a proposition to extend the International Catalog of Scientific Literature, or a proposition to join forces with the Institut International für Techno-Bibliographie.

It may be objected that there are already adequate indexes to technology. Those of a general character I have listed in an appendix to this paper. The mere fact that there are so many attempts to do the same thing is the best argument for unification of effort in this direction, especially as most of those in existence are not adequately supported, and do not cover adequately the literature of the world. In few of these are included all those features which seem to me essential in an index of this character.

It seems to me that the requisites of a perfect index are the following:

Prompt and frequent issue.
Prompt and frequent cumulation.
Adequate classification.
An author index to all entries.
An index of specific subjects for all entries.
Illustrations where necessary.
The inclusion of important patents.

Let me take these up serially.

Frequent and prompt issue precludes cooperation in the real work of indexing by indexers separated from each other by long distances. It requires the index to be made in one place, and from economical considerations this is absolutely necessary. It means that the use of volunteer unpaid assistance should be discountenanced. It would require the organization of an efficient central printing and mailing department.

*See references appended to this article.

*A paper to be read before the Special Libraries Association at a meeting to be held at the United Engineering Societies Building, New York City, Sept. 27, 1911. Discussion of the paper at the meeting, either oral or written, is invited.

†Librarian of the Engineering Societies, 29 W. 39th St., New York City.

‡British Association for the Advancement of Science. Glasgow meeting, 1855, page lxvi. Compare Smithsonian Annual Report, 1856.

*B. A. A. S. Report, 1856, p. 463.

†B. A. A. S. Report, 1857, p. xxx.

Frequent cumulation would require the use of the linotype, and the provision of storage for the type of the entries until the cumulation was issued, if not longer.

Adequate classification is difficult. Even the International Catalog of Scientific Literature only escaped abandonment because the majority of the original delegates refused to accept the Decimal Classification, which was at that time lamentably deficient in pure science. It is probable that the advocates of that and other classifications would attempt to dominate any international congress. Men's minds differ widely on subjects of classification; but the prominent character of such delegates as would be selected should insure men of great judgment and conservative action might be expected.

A classified index, as opposed to an alphabetical one, is of course essential if the use is to be international, as no alphabetical arrangement of subject headings in any one language could be conveniently used by all.

An author index to the classified index is essential, in order that one may trace citations to the literature which give only the author's name, and trace all the investigations published by one person. An index of specific subjects is also essential, and should be in one alphabet in at least three languages, English, French and German, and might have entries in Italian as well. Such an index would do much to rectify any mistakes in classification, and would make available entries of subjects which in any system of classification might be entered in more than one place.

Illustrations are almost essential to the clear understanding of many articles, especially those describing technical apparatus, machinery and construction. With the modern cheap processes of reproduction, these need be slight in cost. Illustrations are especially important where descriptions of patents are included, as they should be. The patents represent the latest discoveries in technology, and as such, have paramount importance, as discoveries are often first announced as patents.

Where should the index be edited and issued? This is of course a matter for the decision of an international conference. It should be in connection with a great technical library, which should have unusual facilities for the accumulation of literature, and in connection with great engineering organizations which would give the index an acceptance at least equal to that issued by the Royal Society. It should be connected with an institution of assured permanence, and not with any private commercial organization. It might well be placed in connection with the Library of the Engineering Societies, which is even now one of the greatest collections of engineering books in the world.

In connection with the compilation of the index, there should be established a bureau which would furnish accurate transcripts of any article desired, with reproductions of the necessary plates and illustrations, and, if necessary, translations of articles from any European language to any other.

The chief reason for my advocacy of international cooperation is the insurance of adequate financial support. The duty of the government to support such enterprises as this international index has been recognized by nearly every civilized government in the support given to the International Catalog of Scientific Literature by these governments, and the extension of that support to this index would seem to follow as a natural consequence. The index once started might well attract substantial endowment from some of our wealthy men whose fortunes have come to them through the advance in applied science, and such endowment would be more certain if it were known that the permanency of such an index would be assured by international action. This would add one more link to the chain which is slowly being forged to bind the nations of the earth in international peace.

Appendix: Existing General Indexes of Technical Literature.

American.

1. Galloupe, Francis. An index to engineering periodicals, 1883 to 1887, inclusive. Comprising engineering, railroads, science, manufactures and trade. Boston: 30 Kilby St. New York: Engineering News Publishing Co., 1888.

This index contains about 10,000 references. Alphabetical by subjects. About twenty periodicals are indexed, of which only two are non-American. No society publications are included. Mr. Galloupe was a member of the American Society of Mechanical Engineers.

Continued as:

Galloupe's general index to engineering periodicals, from 1888 to 1892, inclusive. Vol. 2. Boston: 1893.

Similar to the above, except that some society publications are included.

2. Descriptive index of current engineering literature. Vol. 1. 1884-1891, inclusive. Chicago: Published by the Board of Managers of the Association of Engineering Societies. [1892].

Alphabetical by subject. Compiled by Prof. J. B. Johnson, of Washington University, but really a cooperative undertaking. Several periodicals in foreign languages are included. One hundred periodicals are indexed.

Continued as:

The Engineering Index. Vol. 2. 1892-1895. Edited by J. B. Johnson. New York: The Engineering Magazine, 1896.

Alphabetico-classed. The preface, signed by Professor Johnson, contains the following: "While it would seem that this index work is properly the work of the national engineering societies, yet it would be difficult for them to act in conjunction."

——— Vol. 3. 1896-1900. Edited by Henry Harrison Suplee. New York: The Engineering Magazine, 1901.

Alphabetico-classed. Indexes 200 periodicals, largely foreign, 40,000 entries.

——— Vol. 4. 1901-1905. Edited by H. H. Suplee. New York: The Engineering Magazine, 1906.

Two hundred and fifty periodicals indexed; 50,000 entries.

Continued as:

The Engineering Index Annual. 1906-1910. 5 vols. New York, 1907-1911.

Classified. Indexes 250 periodicals. Should have an author index and an index to specific subjects. These volumes are the annual cumulation of the index published in the numbers of the Engineering Magazine.

3. Technical Literature. Vol. 2. New York: 1907.

Vol. 1 of this periodical contained no index to periodicals. Classified. Indexes 150 periodicals. Not cumulated, the index being included in the monthly issues.

Continued as:

The Engineering Digest. Vol. 3-7. 1908-1910. 5 vols. New York: 1908-1910.

Classified. Issued monthly. Cumulated as The Technical Press Index, for the period from Jan., 1908, to June, 1909. New York: Technical Literature Co., 1909.

Contains about 11,000 entries.

Continued as:

Industrial Engineering and the Engineering Digest. Vol. 8-9. 1910-1911. New York, 1910-1911.

A current monthly index. Classified. Two hundred periodicals indexed. No cumulation has as yet been issued.

Belgian.

1. Index de la presse technique. Vol. 1-17, April, 1903, to March, 1911. 17 vols. Bruxelles, 1903-1911.

Issued by the Institut International de Bibliographie of Brussels. Classified by the Decimal system, as modified and extended by the Institut. Three editions, one each in English, French and German. An edition is printed on one side, for pasting on cards. Is not cumulated, has no author index, and being published only in the monthly form, has little use as a permanent index, unless cut up and pasted on cards.

Continued as:

Revue de l'ingénieur et index technique. Publication mensuelle de documentation technique et industrielle. Organ officiel de l'Office internationale de documentation technique.

Monthly, beginning with April, 1911. No mention is made of any plan for cumulation.

German.

1. Repertorium der technischen literatur die Jahre 1823 bis einschl. 1853 umfassend. Berlin, 1856.

Compiled by Dr. Schubarth for the Ministerium für Handel, Gewerbe und Arbeiten. Classified, with a subject index. Indexes 115 journals, of which three only are American.

Continued as:

Neue folge. 1854-1868. Herausgegeben von Bruno Keri. 2 vols. Leipzig, 1871-1873.

——— 1869-1873. 2 vols. Leipzig, 1876-1878.

——— 1874-1908. 35 vols. Berlin, 1875-1909.

The last series was issued annually under the auspices of the German Patent Office. It increased remarkably in size and in the number of periodicals indexed. Is supplied in the later volumes with an author index, and with an index of specific subjects, the latter in English, French and German.

Continued as:

Fortschritte der Technik. Jahrbuch des Internationalen Instituts für Techno-Bibliographie. Jahrg. 1909. Berlin, 1910.

The same matter is issued monthly under the title "Technische Auskunft," of which this is the annual cumulation. Is also issued in an English edition. Indexes about 1,000 publications, having in 1909 about 60,000 references. Has an author and subject index, and includes patents, books and trade catalogs. The monthly issue is divided into seven parts, any one of which may be subscribed to separately. An issue is printed on one side for pasting. This is the only index which can pretend to have completeness, and is a monumental piece of work. It is illustrated.

A condensed review of ancient and modern chemistry, followed by some remarks on the development and the conservation of what might be termed natural power, formed a considerable portion of the presidential address of Sir William Ramsay, delivered recently before the British Association for the Advancement of Science, at Portsmouth, England. The address was printed in full in "Science" (Lancaster, Pa.) for Sept. 8, 1911.

REVIEWS

An Abstract of Literature on Steam Turbines.

Reviewed by CHARLES E. LUCKE,* M. Am. Soc. M. E.

STEAM TURBINES.—A Short Course on Theory, Design and Field of Operation. By Joseph Wickham Roe, M. E., M. Am. Soc. M. E., M. Am. Inst. Mining Engineers, Assistant Professor of Mechanical Engineering, Sheffield Scientific School, Yale University, New York and London: McGraw-Hill Book Co. Cloth; 6¾ × 9½ ins.; pp. 143, including folding diagram and 71 text figures. $2.50 net.

Primarily prepared for students taking short courses in the steam turbine, this book is an excellent illustration of the sort of thing every instructor of engineering students must do in teaching any of the subjects of the ordinary curriculum, but which few of them ever put into type. It is an abstract of the literature on steam turbines, as set down in the standard works on the subject, with here and there an insertion from comparatively recent papers that have not yet been incorporated in the larger and more complete books, like Stodola's. There is practically nothing new in it, but the material has been selected with excellent judgment and as clearly presented as could reasonably be expected considering the nature of the subject; far more clearly, in fact, than in most of the other books in which beginners without the guidance of skillful teachers usually get lost in the maze of detail. The chief characteristic of the book, therefore, is to be found in its omissions, which have been so adjusted as to allow the material used to dwell on the high spots of the subject, but like many others of the "short-course" kind of book it is likely to give the student a quite wrong impression of the nature and real difficulties of the problem.

No doubt the first duty of an engineering school and its instructors and the primary duty of its text-books is to teach the student that which all good engineers know and about which there is no controversy; that is to say, the basic principles of each of the several branches of good engineering. This being pretty generally recognized as proper, the next step is interpretation. In too many cases interpretation has meant to teachers and writers simply brevity, the omission of all that is difficult and complete silence on all that is confusing. It is just this sort of reasoning that prompts books like this one by Professor Roe, which is unqualifiedly good in what it presents but which may be criticized, together with many others as a class, not for what is said but what is not said and for the mistaken point of view that seeks to justify the omissions.

If there is one fault of American engineering students and young graduates that stands out more than others it is that so often and consistently reported by foreign engineers, notably Englishmen and Germans: An unwarranted tendency to talk big, to act overconfidently and assume an air of great learning on insufficient foundation, sometimes summed up in the word superficiality. Without seeking the cause of this and admitting that there is at least some if not complete justification for it, all of us, and especially those charged with responsibility, must do what we can to counteract it, and one of the things to be avoided is the *"short course,"* the *"brief treatise,"* and the *"thorough presentation without mathematics."* Some non-mathematical treatments of subjects essentially quantitative are necessary; some small books or short abstracts, likewise, but only to serve as bait, a means of leading a student more understandingly into the real subject; for no engineering subject is real that is not concerned with quantities, with complexities and almost endless ramifications.

It must be set down, therefore, as the second and still more important duty of teachers and books concerned with engineering to present engineering as it is; a hard, complex problem with

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seldom a single solution on which all will or can agree without controversy; a perpetual grind and the most delightful occupation known when once the power to see the light is attained. This little book on turbines will be eagerly read by thousands of students of the subject. The reviewer feels no doubt on that score, and the desire to master it will stimulate a more thorough study of heat and thermodynamics than has been the rule in some quarters, for it is written on the thermal analysis basis, but it is feared that it will promote that feeling of command over the subject that seems to be natural with our students when they learn a little, and more especially when that little has been presented too clearly or learned too easily.

To summarize in a few words: What is told is well told and the reader will learn some essential things about turbines, but he will not know the real problem of turbine construction, of the conversion of heat into work by the turbine method, or of the competitive value of turbines and reciprocating engines as power station units; but unless the reviewer is much mistaken in his estimate of the American boy, he will think he knows all these things quite thoroughly.

In the opening article formulas for the kinetic energy and velocity of a steam jet are derived in terms of the difference between the total heat of the steam before and after expansion and this is followed bp the determination of the heat difference by the steam table, temperature-entropy and total heat-entropy diagram methods per adiabatic expansion or any per cent. reheat friction loss during expansion that would be otherwise adiabatic. By combining the velocity of the steam thus determined for empiric data or assumed nozzle friction with empiric values of the weight discharged by the critical pressure limit an expression for the work of jets and water rate of the jet horsepower is derived. This work is the subject matter of the first chapter and is completely treated in fifteen pages, including about three pages of problems and references given to Thomas, Jude, Neilson, Meyer, French, Stodola on Turbines and Marks and Davis Steam Tables and standard works on thermodynamics.

The second chapter is a 24-page treatment of the relation of steam passing through nozzles to its passage through vanes, with graphic analysis of velocity of steam with respect to nozzle and to vanes, quality changes of steam and conditions for maximum abstraction of steam jet kinetic energy by vanes. The methods here described and principles established are applied to numerical examples of blading for different turbine types, including single and multiple staging, with velocity and pressure steps, and both impulse and reaction steam forces. The third chapter (32 pages) is illustrated by diagrams and photographic reproductions of turbines of several types. Problems are added as in the previous chapter.

These three chapters, totaling 72 pages, complete the analytical work. Succeeding chapters are concerned with mechanical construction of the parts and their arrangement in complete machines. In conclusion, there is a brief examination of the low-pressure turbine and of the use of regenerators for intermittent high-pressure exhausts, the value of superheat and high vacuum and the relative economy of performance of reciprocating engines and turbines.

The whole treatment is clear and straightforward, but presupposes some knowledge of heat and general constructural practice in the building of machinery and of operating conditions. It would be difficult to make a better abstract of the subject within the same space limits. To those who might find it necessary to study the subject in this way the book can be heartily recommended, but it is far better for those who can do so to study the subject from standard works like Stodola, under the guidance of teachers who can select the quantity of material suitable for any desired length of course, and by exposition make clear the relations studied as well as the bearing on the whole problem of the omitted parts, if there be any.

Railway Rates and the Interstate Commerce Commission.

RAILWAY RATE THEORIES OF THE INTERSTATE COMMERCE COMMISSION.—By M. B. Hammond, Professor of Economics and Sociology, Ohio State University. Cambridge, Mass.: Harvard University. Cloth; 5½ × 8½ ins.; pp. 195.

All who make any pretense of following the rate decisions of the Interstate Commerce Commission or who are interested in railway rate making have reason to welcome this attempt of Prof. Hammond to deduce from the long line of decisions handed down by the Interstate Commerce Commission the theory or theories on which the rate decisions of that body have been based. The study is made from the economic rather than the legal viewpoint and therefore is all the more interesting to the majority of our readers.

The author states that no single principle has been used by the Commission for solving all the problems of rate making. He classifies the factors involved under certain heads and makes them the main topics of his discussion. The classification is as follows:

(1) The relative values of the commodities transported; (2) the relative costs of transporting the commodities; (3) the relative distances the articles are carried; (4) the relative natural advantages of location possessed by various places; (5) the special and peculiar interests of a given section or of a given class of producers; (6) the importance of maintaining competition; (7) the extent to which a given rate tends to yield a fair return on the actual capital investment.

It is unnecessary to follow the author through his discussion. He shows that in its early life the Commission laid much stress upon the value-of-service theory and that latterly it is giving considerably more and perhaps continually increasing weight to the cost-of-service theory; but that throughout its long line of decisions no one consistent theory has been followed. This has been partly due to the complexities of rate making and the necessity of taking a great variety of factors into consideration, some of which predominate in one case and some in another, while in other instances great weight has to be given to two or more factors. In addition, the changing membership of the Commission and the decisions of the U. S. Supreme Court have led to more or less shifting of ground.

Prof. Hammond's review seems to show conclusively that cost of service must be the ultimate basis of rate making, if a consistent economy and equitable policy is ever to be adopted and followed. Other considerations, of course, have to be taken into account, but these should modify rather than govern. As a corollary, though Prof. Hammond does not deduce it, it follows that more and more attention will have to be given to the physical valuation of railway properties, a point which may commend this study to the attention of some engineers who would not otherwise care to give it much consideration.

PRIMER OF SANITATION FOR THE TROPICS.—By John Woodside Ritchie and Margaret Anna Purcell. Yonkers-on-Hudson, N. Y.: World Book Co. Cloth; 5¼ × 7¼ ins.; pp. 182; 94 text figures. 60 cts., including postage.

The authors have here presented in simple language and for study in elementary schools in the tropics, with special relation to the Philippines, the most essential elementary principles of hygiene and sanitation, with particular reference to the individual and the part which the individual may take in causing or preventing the spread of diseases to others. The book seems to follow much the same lines as the earlier one in the same series written by the senior author of the present volume, but the whole subject is presented with a view to conditions which prevail in the tropics, including a number of diseases prevalent there but not occurring in this country.

We are pleased to note that there has been omitted from the present volume the unfortunate statements on sewage disposal which appeared in the "Primer of Sanitation," noticed in our issue of Jan. 13, 1910.

PRACTICAL APPLIED ELECTRICITY.—A Book in Plain English for the Practical Man. Theory, Practical Applications and Examples. By David Penn Moreton, B. S., E. E.; Associate Professor of Electrical Engineering at Armour Institute of Technology, Assoc. M. Am. Inst. E. E., etc. Chicago, Ill.: The Reilly & Britton Co. Flexible leather; 4½ × 7¼ ins.; pp. 438; 323 text illustrations; 15 tables. $2. net; postage 12 cts. extra.

One would expect that an electrical engineer experienced in teaching his art and science to young men ought to be able to produce about the best sort of a practical handbook on the subject that could be realized. Such expectations, aroused by a glance at this book, are realized by closer study of the individual parts. No particular novelty in the explanations of the phenomena and apparatus involved were to be expected and possibly the book is better adapted to its purpose because of this. At least, those who progress from this to higher texts will suffer little from any peculiar presentation of the most elementary ideas. The author's expressions are clear and generally concise; the print is clean and the illustrations unusually good, most of them evidently being specially prepared for the book. This results in a uniformity of appearance which compares favorably with the heterogeneity of some previous "practical" handbooks.

The author carries through the discussions of the circuit, resistance to flow, batteries, induction, instruments, generators, motors, power distribution, lighting and wiring, for the simple cases of direct currents. Presentation of the concepts of alternating currents is left to the end. The book closes with directions for resuscitation, weight and measure and wiring tables, etc.

CITY GOVERNMENT BY COMMISSION.—By Ford H. McGregor, Instructor in Political Science, The University of Wisconsin. Madison, Wis.: University of Wisconsin. Paper; 6 × 9 ins.; pp. 152. 40 cts.

The commission plan of city government by means of a very few men, elected at large, and having complete control of legislative and executive functions, has been the subject of fugitive articles for a number of years and is now receiving more extensive and dignified treatment in pamphlets and books. Of these last we have already noted four or five,* and two more books are expected within a few months.

The pamphlet before us is a satisfactory general review of the whole subject, which, like its predecessors, lays no claim to originality of thought. It opens with a sketch of the "Commission Government Movement"; defines commission government; analyzes the Galveston, Houston and Des Moines plans, and presents variations from these. There follow a comparative analysis of commission government, facts and opinions as to the success of the plan, a partial list of commission cities, a bibliography and an index.

The general attitude of the author is favorable to the commission plan, but he states some of its disadvantages, and warns his readers that as yet the plan has had only a brief though somewhat extensive trial.

ELECTRIC LIGHT FOR THE FARM.—Part I.: Low Voltage Electric Lighting with the Storage Battery. Part II.: Wiring Houses for the Electric Light. By Norman H. Schneider. New York: Spon & Chamberlain. London: E. & F. N. Spon, Ltd. Cloth; 5 × 7¼ ins.; pp. 86; 42 text figures. $1, net.

This little manual gives first some very simple and sensible directions about selecting and running very small gas-engine-driven generators for charging storage batteries. The outfits are to be used in the country wherever low-voltage electric lighting and supply is desired. Tungsten-filament lamps are recommended for econ-

*Selected Articles on the Commission plan of City Government. Compiled by E. Clyde Robbins. The H. W. Wilson Co., Minneapolis, Minn. $1 net. Feb. 17, 1910.

The Dethronement of the City Boss. By John J. Hamilton. Funk & Wagnalls Co., New York. $1.20 net. July 14, 1910.

Commission Plan of City Government. Bulletin of the University of Wisconsin. Nov. 17, 1910.

Loose-Leaf Digest of Short Ballot Charters. By Charles A. Beard. The Short Ballot Organization, New York City. $5 net. April 13, 1911.

omy in first cost of the generator and storage plant and in operating expense. A second part describes good methods of running wires in a house, setting fixtures, switches, etc. The book is well prepared and admirably adapted to its purpose.

The Art and Science of Illumination.

ILLUMINATING ENGINEERING.—Lectures Delivered at the Johns Hopkins University October and November, 1910, under the joint auspices of the University and the Illuminating Engineering Society. Vols. I. and II. Baltimore, Md.: The Johns Hopkins Press. Cloth; 6 x 9¼ ins.; pp. 1,032; 115 text figures. Subscription price, $4 per set.

In October and November, 1910, a series of lectures on the art and science of illumination was given at Johns Hopkins University under the joint auspices of the University and the Illuminating Engineering Society. These lectures followed immediately upon the annual convention of the society and the combination or sequence of events served to stimulate interest in both. The lectures (34 in all) were given by men whose names are familiar in the gas and electric-light industry or in some allied science. There were some 250 men in attendance from scattered localities, but to further increase the usefulness of the lectures they have been reprinted by the university press in two moderate-sized volumes, the sale being by subscription.

So much interest has been aroused in the past six or eight years in the so-called "illuminating engineering" and in campaigns for safer (physiologically), more artistic and economic lighting, that these volumes become of extraordinary interest. They will generally be regarded as a compendium of at least the elementary principles and practice of the new work.

The lectures are reprinted as such and the books may be regarded as a series of hour-long discussions of a string of related topics. This arrangement has some advantages for the readers who desire to pick and choose, or who can read only at intervals. The sequence is logical, beginning with the physics and chemistry of light production, following with the characteristics of modern illuminants, the generation and distribution of electricity and gas, veering off first in one direction to take up the measurement of light flux and then in another to take up matters of practice like architectural effects, physiological and psychological aspects, finally returning to the actual design of lighting schemes for interiors and out-door areas.

Prof. Joseph S. Ames, of Johns Hopkins University, in three lectures reviews some elementary ideas of physics to orient the reader at the outset. Then Dr. E. P. Hyde, Director of Research Laboratory, National Electric Lamp Association, takes up the work and discusses heat and light radiation in general and as related to electric incandescent and arc lamps, to incandescent mantles and glowers. Then Dr. W. R. Whitney, Director of the Research Laboratory of the General Electric Co., takes up the chemistry of light sources, briefly by the recital of a few facts about the materials used in arc and incandescent lamps. Dr. C. P. Steinmetz discusses, in his two lectures, some of the ideas previously advanced but showing the more practical or commercial application to specific apparatus and the characteristic performances of light sources as parts of electric circuits. Then Dr. Alexander C. Humphreys, of Stevens Institute, and Prof. M. C. Whitaker, of Columbia University, divert attention to gas illuminants, the latter describing particularly flame and mantle burners and the former some special gas processes—the manufacture and use of Pintsch oil gas, carburetted air, and acetylene.

Dr. J. B. Whitehead, of Johns Hopkins University, gives a lecture on purely electrical engineering where it is closely related to lighting—generating systems and distributing lines.

In a somewhat similar way, Mr. E. G. Cowdery describes the manufacture and distribution of coal and water gas.

The measurements of candle power of light sources and the standards on which comparisons are made are presented by Dr. E. B. Rosa, of the U. S. Bureau of Standards and Dr. C. H. Sharp, of the Electrical Testing Laboratories, New York City. Dr. Rosa confines himself largely to the definitions of photometric terms and the use of standard lamps, while Dr. Sharp takes up more particularly the various pieces of photometric apparatus and their use.

Mr. Walter Cook adds, at this point, a lecture on architectural aspects, in which he calls up in the most general way the architect's ideas of lighting—that of adding to quietness or increasing the sparkle of a gay "atmosphere."

Dr. P. W. Cobb, Physiologist of the Research Laboratory, National Electric Lamp Association, contributes two lectures on the physiology of vision—a field with which we should suppose few engineers were familiar and one which we know physicists have seldom invaded, the great exceptions being, of course, the instructive excursions of Young and Helmholtz. Dr. Cobb describes the human eye—not merely giving superficially the positions of ball, cornea, aqueous "humor," iris, lens, vitreus "humor," retina and muscles which were made familiar to us in our school physiologies, but he explains the optical defects and pictures in detail the structure and functions of the retina as known today. Eye discomforts and injuries arising from use or misuse of light sources, are treated much differently than we have often heard less-informed persons assert with confidence. It is concluded that the discomfort and impairment of vision, growing so marked of recent years, are not so much due to the mere shedding of rays at the heat or ultra-violet ends of the spectrum as to increased hours of work requiring use of the eyes and to the employment of strong artificial light toward the close of the long day when eye and brain are tired.

Quite a different turn to the discussions is given by Prof. Robert M. Yerkes, of Harvard University, who outlined rather briefly a few psychological matters intimately related to light and color sensations and the bearing of such phenomena to actual lighting schemes.

Having thus laid down a very broad foundation for the development of technical methods, the following lectures deal with what we more easily recognize as the every-day art and science of illumination—calculations of illumination to be secured, design of lighting systems, measurements of light fluxes and many accompanying interrelated works of longer established branches of engineering and architectural design. Prof. W. E. Burrows, of the Massachusetts Institute of Technology, expounds the laws governing the pre-calculation of illumination. Mr. L. B. Marks, of New York, in two lectures, outlines some of the practices which must accompany mere calculation of candle-powers, distribution, flux, absorption, etc. Necessarily in such matters as Mr. Marks discusses, experience figures tremendously, and this appears in a tendency toward generality that borders at times on vagueness. The general problems of artificial lighting outlined are the now-familiar ones of securing, in a general way, daylight effects. Preliminary to taking up artificial lighting, there is an introduction on the characteristics of daylight and the design of structures to admit proper amounts of natural light. Mr. Marks, after laying down the general guiding lines which experience shows must be followed for greatest success in planning artificial lighting, shows the applications in the cases of (1) the State, War and Navy Building in Washington; (2) the Carnegie Libraries in New York City; (3) a textile mill; (4) the rotunda of the National Museum in Washington.

Mr. Norman Macbeth, of Pittsburg (at the time Illuminating Engineer for the Welsbach Co.), enters a few good words for gas lighting in the next lecture, combating the impressions which people are largely supposed to have that gas lighting is unhygienic, and less susceptible of scientific or artistic treatment than electricity.

Outdoor lighting is discussed in two lectures by Dr. Louis Bell, of Boston, in one of the most helpful lectures of the series. He divides his subject into three topics: (1) Lighting of structures; (2) lighting of park areas, and (3) street lighting. In the first division the use of search lights and numerous small lamps to flood salient architectural points and the practice of outlining structures to enforce or correct false perspective are important sub-topics. In the second division, character and time of [illegible] of parks and public ways are described in their effect on the needs of a lighting system to promote public comfort or pleasure, and to insure safety from personal attacks or traffic accident.

Mr. E. N. Wrightington follows with a history of outdoor gas lighting and descriptions of apparatus in use. Mr. V. R. Lansingh, of the Holophane Glass Co. of New York, describes the more prominent types of shades and globes, and Mr. E. F. Caldwell, of E. F. Caldwell & Co., New York City, gives some very general remarks on the design of fixtures to hold the light-sources and auxiliary equipment. Mr. Caldwell classes fixtures with furniture, to be proportioned to, and harbonized with, the architecture and decoration but otherwise very largely dependent on the personal tastes of the owners and designers especially in matters of elaboration of detail and motive.

This series of lectures is very properly rounded out by two commercial papers—one dealing with electricity and one with gas. The first, by Mr. J. W. Lieb, Jr., of the New York Edison Co., might be called economic rather than commercial, as it is a description of a somewhat idealized public-utility corporation under governmental regulation. Such matters as public relations, rate schedules, metering and advertising have a place here as well as a service equipment and organization.

The second of these twin papers, by Mr. Walton Clark of Philadelphia, is perhaps less broad than the first, but it proceeds in much the same way to outline the establishment of a gas supply and the steps necessary to secure good service and ample return to the investors.

FLYING MACHINES TO-DAY.—By William Duane Ennis, Professor of Mechanical Engineering in the Polytechnic Institute of Brooklyn. New York: D. Van Nostrand Co. Cloth; 5½ x 8 ins.; pp. 205; 123 illustrations in text. $1.50, net.

Prof. Ennis, with the volume at hand, covers the same ground as do a few other recent popular expositions of the theory of artificial flight. The presentation varies, in all these various books, from the condensed handbooks by Chatley, and Hubbard, Ledeboer and Turner (see this Supplement for April 13 and May 18, 1911) to the various extra-high dilutions of theory with description and entertaining illustration. Pro Ennis' treatment is not of the extremely condensed variety, and it should prove easily readable to the non-technical reader. We should think that it would not appeal to the engineering reader as much as the two other works named. The book is very attractively arranged, with a certain pleasing uniformity of style throughout, not seen in many of the books on flying machines which have been rushed out. The story is well told and there is a certain freshness of viewpoint, resulting from the author's engineering knowledge.

A NEW IDEA IN SANITATION.—The Great Menace to Public Health That Covers Every Mile of Railroad Track in the United States and Other Countries.—Compiled by J. C. Salter (26 Broadway, New York City). Paper; 6 x 9 ins.; pp. 89.

The larger part of this pamphlet consists of extracts from various reports on the water-supply of Seattle, Wash., and other cities from infection from human excreta scattered by railway trains and of extracts from the "Report on the Origin and Spread of Typhoid Fever in the U. S. Military Camps During the Spanish War of 1898." The Seattle reports were by Prof. Wm. T. Sedgwick, John W. Alvord, John R. Freeman and others. They were abstracted in Engineering News, April 30, 1906, p. 238, and Dec. 27, 1906, p. 684, and were published in the Journal of the New England Water Works Association, Vol. XX., No. 4, 1906. Besides the matter already mentioned the pamphlet contains reprints of various supplementary papers, some explanatory and some didactic in character. A useful service has been rendered in bringing all this matter together.

Cable Inclines, Cable Railways and Aerial Tramways or Cableways.

CHEMINS DE FER FUNICULAIRES TRANSPORTS AERIENS.—By A. Lévy-Lambert, Ingénieur, Chef des Services de l'Eclairage et du Chauffage, du Chemin de fer du Nord. Paris: Gauthier-Villars, Imprimeur-Libraire (Quai des Grands-Augustins, 55). Paper; 6½ x 10 ins.; pp. 526; 213 text figures. Francs, 15; American price, $4.50, net.

The author of this book appears to have given considerable time to the study of railways of exceptional types. A former book dealt with the subject of "Rack Railways" (reviewed in this Supplement July 16, 1908).

In his present book on "Cable Railways" the subject matter is divided into three classes: (1) cable inclines (300 pages), (2) cable street railways (74 pages), and (3) aerial tramways or cableways (90 pages). The first edition was published in 1893, and in his preface to the second edition the author states that while cable traction for street railways has become obsolete (due to the rapid development of electric traction), yet there has been a great increase in the number of cable inclines for mountain ascents and of aerial tramways for handling freight. The book is of value in bringing together much information relating to this class of traction, especially in regard to mountain inclines and aerial tramways, for both of which there are opportunities of development in this country. The book is well printed and freely illustrated. It has a list of contents, but no index, which is a serious omission. It gives a three-page list of books dealing with the same general subject.

The subject of cable inclines receives the greatest share of attention, since lines of this sort are common in Europe, and are increasing in number. Most of them are mountain-climbing lines in the Alps, largely for tourist traffic, but some of them are for city use. None of them appear to resemble the lines at Cincinnati and Pittsburgh in this country, where wagons, carriages, street cars and pedestrians are all carried together, and there is no mention of these lines. Most of the inclines mentioned are in continental Europe. On the other hand there is a description of the Ashley inclined planes of the Philadelphia & Reading R. R., on which trains of ordinary coal cars are handled by cables attached to "barney" cars which butt against the rear of the train. (Engineering News, March 25, 1909.) The inclines are divided into two classes: (1) those operated by engines or motors, and (2) those operated by a water-ballast tank on the descending train or car, to give an excess weight beyond that of the ascending train. In both cases the movements are alternate, the cars being attached to the opposite end of a cable, and one ascending while the other descends.

The author gives a mathematical discussion of the operation of these lines, in which gravity plays an important part, and then proceeds to deal with individual features; the track and passing places, the cables and carrying pulleys, the operating machinery, the rolling stock, and the brakes and safety devices. There are notes also on operating results. A special chapter of 70 pages deals with the lines operated by gravity, a water-ballast tank on the descending car giving sufficient excess weight to cause this car to descend while pulling up the other car. About 50 individual lines of both the power-operated and gravity-operated classes are described more or less in detail.

The chapter on lines operated by endless cables includes some inclines, but deals mainly with street railways operated in this manner. This part is of relatively little interest in this country, where cable traction of street railways is almost obsolete. Much of the information, also, is taken from Bucknall Smith's "Cable or Rope Traction" (London, 1887), due credit being given, but it is very much out of date, and makes no reference to the fact that several of the lines mentioned have long ago been converted to electric traction, the author being apparently in some doubt as to this. San Francisco, Chicago and New York are included; also the Highgate Hill line in London (now electric) and the Belleville line in Paris. Different types of track construction, brakes, grips, etc., are described. This part of the book, however, would be of little value or interest to the American engineer.

The chapter on aerial tramways describes a number of individual lines, and also the construction of the towers, bucket carriers, grips, cables, etc. It gives also, particulars of cost of construction and operation. In lines of this class, the cars are small buckets suspended from carriers or trucks riding on a cable supported at intervals by towers, the span between supports ranging as high as 1,900 to 2,300 ft. in exceptional cases. In most cases the track cable is stationary, and the cars are moved by being attached to an endless hauling or running cable. In the monocable systems, however, an endless running cable serves both for track and haulage; this is sometimes operated automatically, as where the grade is sufficient for gravity operation and the descending buckets are loaded while those ascending are empty. Lines of this particular sort, however, are comparatively few. In this section of the book, as well as in the others, the author is by no means merely descriptive; the calculation for strength and sag of cable, and the cost of construction and operation are among the subjects included.

The special value of the book is as a work of reference regarding cable inclines and aerial tramways.

THE RAILWAY LIBRARY, 1910 [Second Series].—A Collection of Noteworthy Addresses and Papers Mostly Delivered or Published During the Year Named. Compiled and edited by Slason Thompson, Director of Bureau of Railway News and Statistics, Chicago. Chicago, Ill.: The Bureau (Railway Exchange Bldg.) Cloth; 5½ x 8½ ins.; pp. 456; one plate. Gratis; postage 15 cts.

It almost goes without saying that those behind the publication of a well-made volume of more than 400 pages, offered free to any one who will pay postage on it, must be carrying on a propaganda of some sort. The volume contains no direct explanation of the object of its publication and distribution, but opposite the title page there appear a few sentences from the Springfield "Republican," one of which is as follows:

> As much of the material so liberally supplied the public is hostile to the railroads, this presentation of their side of the story will be of special value to readers and students.

The volume includes among other papers a "Retrospect of American Railways" written as long ago as 1868 by Henry V. Poor, and also a brief account of the 75th anniversary of "The First German Railway" translated from a German paper. A considerable amount of space is also given to the recent opinion of the referee in the decision of the lower U. S. court in the Minnesota rate case. Numerous other subjects of interest to railway men and the public are also covered by reprinting papers by authors of more or less prominence. The volume closes with a summary of railway statistics for 1910, prepared by Mr. Thompson.

If some one else would bring together a few of the best papers on the anti-railway or public side of the discussion a service would be rendered, but who would foot the bill, and how many would pay postage to obtain a copy?

THE UNDEVELOPED FIELD IN THE LIFE INSURANCE BUSINESS.—By Hiram J. Messenger, F. A. S., Actuary the Travelers Insurance Co. [Hartford, Conn.] A report submitted at the bi-monthly meeting of the Association of Life Insurance Presidents at New York, June 9, 1911. Paper; 6 x 9 ins.; pp. 16. Address The Author.

The undeveloped field mentioned in the title of this interesting pamphlet is a survey of and an attempt to improve the sanitary and general health-protective work of cities through the agency and influence of life insurance companies. The greater portion of the pamphlet is a summary of the results of an investigation of 32 cities of the United States made by the author in 1910 on behalf of the insurance company with which he is connected. Most of the cities were located in the South, but the list also included Hartford, New York, Baltimore, Cincinnati, Indianapolis and St. Louis. The principal points looked into were sewage and garbage disposal, inspection of milk and other food supplies, board of health organization and work and such general matters as climate and topography, the character of the city government and also of the people of each city.

The author reports a gratifying progress in sanitation and health-protective work, particularly in the Southern cities, and at the same time makes clear that woful deficiencies exist in a number of cities. As a rule, specific cities are not mentioned, except for the purpose of praise.

The paper having been presented to the Association of Life Insurance Presidents, the author naturally expresses the hope that that body will

> take the lead in definite and energetic action [looking to the] organization in each city throughout the whole country of a number of intelligent, substantial and influential men with practical common sense, interested in all work to improve the sanitary condition of all of our cities and having enough technical knowledge of modern sanitary science to know the relative importance of things, what ought to be done and how to do it.

Evidently it is expected that local insurance men will take a hand in bringing about this desirable line of work.

FRANCHISES OF ELECTRICAL CORPORATIONS IN GREATER NEW YORK.—A report Submitted to the Public Service Commission for the First District. By Commissioner Milo R. Maltbie. [Reprint of Appendix A of the Annual Report of the Public Service Commission for the First District, State of New York, to the Legislature for the Year Ending Dec. 31, 1910.] New York: Public Service Commission for the First District (154 Nassau St.) Paper; 5¾ x 9 ins.; pp. 237; 13 plates.

Analyses of the many franchises granted to electrical companies in New York City are here prefaced by a brief general discussion. This discussion is arranged topically under such heads as franchises acquired by acquiescence, private contract, etc.; attempts at regulation, limitation of rates and compensation. This discussion is confined to a few pages and appears to be the only part of the report written by Mr. Maltbie. In a prefatory note, Mr. Maltbie gives credit to Mr. Delos F. Wilcox, Chief of the Bureau of Franchises, and his assistants in the bureau for the digest of specific franchises.

PROPERTIES AND USES OF DOUGLAS FIR.—Part I: Mechanical Properties. Partt II. Commercial Uses. By McGarvey Cline, Director, Forest Products Laboratory, and J. B. Knapp, Asst. District Forester. Forest Service Bulletin 88, U. S. Dept. of Agriculture; Henry S. Graves, Forester. Washington, D. C.: Pub. Doc. Paper; 6 x 9 ins.; pp. 75; 3 plates, 15 diagrams and 15 tables.

Douglas fir, in point of production, ranks second to southern yellow pine among American woods and its wide distribution along the Pacific coast, where the present available supply is between 300 and 400 billion board feet, makes it perhaps the most important of the structural timbers of the country. The present bulletin, the result of several years investigation into its physical qualities and its commercial uses, is particularly valuable. The pamphlet contains a resumé of all the extensive tests conducted upon Douglas fir by the U. S. Forest Service, a set of the various grading rules for its sale and an itemized discussion of the many uses to which it is being put.

TRAIN RULE EXAMINATIONS MADE EASY.—A Complete Treatise for Train Rule Instructors, Superintendents, Trainmasters, Conductors, Enginemen, Brakemen, Switchmen, Train Dispatchers, Operators and Others. By G. E. Collingwood, Author of "Standard Train Rule Examination," etc. New York: The Norman W. Henley Publishing Co. Cloth; 4 x 6¾ ins.; pp. 234; one map and many diagrams. $1.25 net.

The standard code of train rules adopted April 25, 1906, by the American Railway Association is the subject of this book. The text is divided into three parts, of which the first explains in clear terms the meaning of the rules. This part is really a rewriting of the subject matter of the code in the form of a connected exposition. The second part of the book presents a set of examination questions designed to completely cover the standard code. Answers to the questions are given separately in the pages following. The standard code itself is reprinted as the third part of the book. The text is followed by about 25 pages of diagrams showing hand, flag and lamp signals and train signals.

Engineering Drawing.

A MANUAL OF ENGINEERING DRAWING FOR STUDENTS AND DRAFTSMEN.—By Thomas E. French, M. E., Professor of Engineering Drawing, The Ohio State University. New York: McGraw-Hill Book Co. Cloth; 5¾ × 9¼ ins.; pp. 289; 452 text illustrations. $2, net.

While evidently written for engineering students, this book contains many practical suggestions and illustrations which will prove of value to any draftsman.

The first 40 odd pages contain elementary descriptions of drafting instruments, their construction, manipulation and care. Many of the suggestions, and above all the excellent illustrations, will prove helpful to the novice.

The short chapter on applied geometry is designed to give some helpful exercises with drawing instruments as well as giving concisely useful constructions for the draftsman to be familiar with. Free-hand lettering is briefly treated in one chapter and many of the common faults of beginners are illustrated. The chapter on orthographic projection is excellent. It gives succinctly and clearly the essentials of descriptive geometry in such a manner that its applications are at once understood. The chapter following, on developed surfaces and intersections, should help many a student over a common stumbling block in "descript."

Pictorial representation by isometric and dimetric projections are covered in one chapter. Trimetric projection is not mentioned, and is doubtless little used, although it gives a much truer picture of the object than either isometric or dimetric projection.*

Some good suggestions are given in the chapter on working drawings. Any experienced draftsman knows that speed in drafting consists more in method than any other one thing. Directions are here given for the order of penciling and the order of inking, which are designed to give the least shifting of triangles and T-square, and the least waiting for ink to dry. Tables are given containing the dimensions of standard bolts and nuts and the conventional methods of representing nuts, threads, etc., dimensions of standard steel and wrought-iron pipe and fittings, and like facts. Conventional symbols used on drawings are illustrated and explained. Twelve rules are given to help in checking drawings. Structural drafting receives scant attention for a subject so important in the field of engineering drawing. The reproductions of a plate girder and a roof truss design are on so small a scale as to be of little help in studying the details which are the all-important part of structural drawings. On the whole, however, this chapter forms one of the most valuable in the book.

Technical sketching is the term applied to making dimensioned sketches from which to make working drawings. Numerous suggestions are given on the use of conventional methods. Architectural drawing is touched upon, and symbols for building materials and for standard electric wiring plans add considerable value to this chapter. Map and topographical drawing is taken up rather too concisely. Nothing is said about the methods of drawing the most important and the most common of all maps, a railway location plan. Several sample topographical maps are given, but they are ones which the average surveyor is least likely to meet with.

The last few chapters cover the methods of reproducing drawings by blue-printing, etc., drawing for reproduction, patent office drawings and notes on commercial practice, such as methods of mounting drawings, enlarging and reducing and preserving drawings and tracings. The last chapter contains a bibliography of drawing and allied subjects which, while not very complete, will be helpful in solving many a problem for the draftsman by directing him to a standard work, covering the particular point in doubt.

The book as a whole is clearly written, and the illustrations are excellent, a point of no slight value in a book of this kind. Ideas on drawing are much more readily conveyed by pictures than by text, and much is to be gained by such clear illustrations as this book contains.

*See Eng. News, April 6, 1911, p. 404.

WATERWAYS AS CREATORS OF PROSPERITY.—By S. A. Thompson. Cincinnati, Ohio: National Rivers and Harbors Congress (J. F. Ellison, Secy.) Paper; 6 × 8½ ins.; pp. 39; five diagrams.

This pamphlet rehearses the principal arguments in favor of waterway construction which have been made familiar to the public by an extensive propaganda during the past decade. In the preface it is stated that "the accuracy and authenticity of the figures used is vouched for, as except where otherwise noted they are taken from Government publications and other official sources."

We are reminded of the trite old saying: "Figgers won't lie; but liars will figger"! Anyone who thinks that data and figures and statistics are necessarily accurate because they are presented in a Government publication has a great deal to learn.

The writer of this pamphlet has gotten hold of a German publication in which two "expert German investigators, specially commissioned by the German Government" have analyzed American railway statistics and deduced the interesting conclusion that instead of the average American railway freight rate being about 7½ mills per ton mile, it is actually 14.4 mills!

Inasmuch as the explanation given as to how this figure was obtained displays ignorance of the methods by which freight traffic is actually carried on in the United States, "these keen-eyed competent observers" as Mr. Thompson calls them can hardly expect to have their work taken seriously in this country.

We can, however, give Mr. Thompson an actual fact regarding German opinion on the question of waterways vs. railways. One of the great canal projects of Europe has been a waterway between the Danube and the Elbe. One of the most eminent of German engineers has taken a prominent part in planning this work and backing it with his professional reputation. Recently, as a result of thorough study of recent railway achievements, in the hauling of heavy freight traffic at very low cost he has become convinced that the construction of the canal would be an economic mistake and that the transportation facilities can be furnished at far lower cost by improving existing railway lines. He has, therefore, publicly announced his reversal of his former opinion.

If Mr. Thompson will with similar open mind compare the actual cost of railway and inland transportation under present day conditions, he cannot fail to reach the same conclusion.

QUALITY OF THE WATER SUPPLIES OF KANSAS.—By Horatio Newton Parker, with a Preliminary Report on Stream Pollution by Mine Waters in Southeastern Kansas, by E. H. S Bailey. Prepared in cooperation with the Kansas State Board of Health. Water-Supply Paper No. 273, U. S. Geological Survey; Geo. Otis Smith, Director. Washington, D. C.: Pub. Doc. Paper; 6 × 9¼ ins.; pp. 375; two maps; 190 tables.

Analytical and other information relating to the water supplies of Kansas is given in this report. Underground waters are considered by counties and the surface waters by streams. Chemical analyses only are given and these are confined to mineral contents for the well waters and largely to mineral contents for the surface supplies. Chlorine is reported for both underground and surface waters; nitrates, volatile and organic matter and total dissolved solids are reported for some of the well waters and apparently for most or all river waters. Some of the river-water analyses also include suspended matters and in some cases turbidities are reported. The analytical data are accompanied by brief comments and are prefaced by a short account of the geology of Kansas. The portion of the volume devoted to mine waters is relatively small.

Realizing the value of publicity for even a government bureau, the Tennessee Geological Survey has just started a monthly bulletin entitled "The Resources of Tennessee," the first number of which is dated July, 1911. It is hoped by calling attention to the valuable work the Survey is doing, the interest of the citizens of the state will be benefited and, incidentally, the Survey may be able to procure more easily the necessary funds for its support.

OFFICIAL HANDBOOK OF THE PAN[illegible] CANAL. Second Edition—Revised and Enlarged. [illegible]son Canal Zone: Compiled by The Secretary o[illegible] Isthmian Canal Commission. Stiff paper; 5 × [illegible] ins.; Illustrated; pp. 30.

We have occasionally received req[illegible]s that we publish an article giving a brief [illegible]pular description of the Panama Canal wor[illegible] Readers asking for such publication say th[illegible]hey have not the time to follow the numer[illegible] detailed articles which we have published [illegible] time to time while the work has been in [illegible]ress, but desire to get a general idea of wh[illegible] is being done. For those who desire this sor[illegible] information, the publication above noted [illegible]dmirably adapted. It has been compiled [illegible] Secretary Bishop of the Isthmian Canal Com[illegible]ssion, and contains the information necessary [illegible]o answer most of the questions which the av[illegible]ge curious person is likely to ask regarding th[illegible]nal work. The difficulty which any one meets [illegible] attempting to compile any such book is in [illegible]ding what is best to include and what must be [illegible]mitted. In the pamphlet before us, excellent judgment seems to have been used in deciding this question.

CONSTRUCCIONES DE HORMIGON ARMADO.—By Juan Manuel de Zafra, Ingeniero del Cuerpo Nacional de Caminos, Canales y Puertos, Professor de Dicha, Asignatura, [illegible] de la de Puertos y Señales Marítimas, etc., in Escuela Especial del Cuerpo. Primera Parte: Mecánica del Hormigón Armado. Madrid, Spain: Imp. y. encuad. de V. Tordesillas. Paper; 6½ × 9¼ ins.; pp. 292; 90 text figures and three inset sheets. Pesetas, 12,50; American price, $3.75, net.

Concrete literature in the Spanish language has been rather limited, in spite of the fact that reinforced-concrete construction has been quite favorably received in both Spain and the Spanish-speaking American republics. It is probable, therefore, that Prof. Zafra's new work will have a wide sale wherever Spanish is the accepted tongue. The book is entirely devoted to the theory of design, corresponding in that respect more nearly to Profs. Turneaure and Maurer's treatise than to any other in English, and has no references whatsoever to any complete structure. The chapters take up successively the history of concrete, its physical characteristics as determined by tests, and, finally, the theory of the design of various members under different stresses by both analytic and graphic methods. It is accompanied by numerous tables and diagrams to aid design.

FIRE AND FIRE LOSSES.—Instruction Paper prepared by F. W. Fitzpatrick, Consulting Architect, Formerly of U. S. Service; Executive Officer, International Society of State and Municipal Building Commissioners and Inspectors, etc. Chicago, Ill.: American School of Correspondence. Cloth; 5¾ × 9¼ ins.; pp. 94; 52 illustrations in text.

It is the intention of the American School of Correspondence to publish a series of some 25 books covering all phases of the subject of fire prevention. The little book noted above is the first of the series. It consists of some general chatty remarks on the nature and wide distribution of fire losses in this country, detailed descriptions of the Baltimore and San Francisco conflagrations and some pages of advice favoring fire resisting construction.

A Traveling Library for Health Officers has been made up by the New York State Department of Health. The library consists of a half-dozen volumes, boxed for handy shipment, as follows: "General Bacteriology," by Prof. E. O. Jordan; "Pulmonary Tuberculosis," by Dr. F. M. Pottenger; "Principles of Sanitary Science," by Prof. Wm. T. Sedgwick; "Sewage Disposal," by Kinnicutt, Winslow & Pratt; "Water Supply," by Prof. Wm. P. Mason; and Schamberg's "Diseases of the Skin and the Eruptive Fevers."

A valuable "Course of Lectures on Army Sanitation," containing numerous suggestions of value to contractors and others who are responsible for large camps of men, was delivered in October and November, 1910, at the Royal Sanitary Institute (London) by Lieut.-Col. C. H. Melville, Professor of Hygiene, Royal Army Medical College. The lectures occupy 78 pages of the "Journal" of the Royal Sanitary Institute for April, 1911. (London, 1s.)

The Strength of Materials.

ELASTIZITÄT UND FESTIGKEIT.—Die für die Technik wichtigsten Sätze und deren erfahrungsmässige Grundlage. By Dr.-Ing. C. Bach, K. Württ. Baudirektor, Professor des Maschinen-Ingenieurwesens an der K. Technischen Hochschule Stuttgart. Sechste, vermehrte Auflage. Unter Mitwirkung von Prof. R. Baumann an der K. Technischen Hochschule Stuttgart. Berlin: Julius Springer: Cloth; 6 × 9½ ins.; pp. 642; 20 plates and many text figures. 20 marks; American price, $8, net.

Bach's widely known work has gone through five editions in the 22 years from first publication, and now appears in the sixth. Its distinguishing characteristic, the thoroughgoing insistence on experimental investigation to test the validity of theory, with rejection of theory that does not find confirmation in test results, is the same that marks all of the author's published writings. This characteristic is just as valuable to-day as it was twenty years ago, in spite of the great amount of accurate experimenting done since then; perhaps it is even more valuable now, when it may serve as warning against the ready impression that testing-machine study of materials has been pretty well exhausted by past experimentation. Bach has always been foremost in supplying proof of the contrary, by bringing out the results of well-planned tests bearing on perplexing detail questions of stress-distribution or strength of particular forms. The tests of this kind which he has made in the six years since the last previous edition of "Elastizität und Festigkeit" appeared are duly included in the present edition, adding materially to the information it conveys.

As a contrasting counterpart to those many treatises on strength of materials which give nothing but the conventional theory or approximation but offer no proof by test, and also as a mine of information to every student of materials or design, the book merits the highest rank. It must be regarded specially as a source of information in matters not represented elsewhere, and here again particularly for that fundamental and yet difficult class of material, the brittle solids (cast-iron being his chief test substance). He who takes up Bach's book expecting to find all the current problems and difficulties fully discussed will be disappointed. So, for example, the treatment of column strength is anything but adequate; yet in this instance the reader must appreciate that if column strength were dealt with in the full spirit of Bach's investigative manner, that chapter alone would be as large as the entire book. Only what is actually in the book should be sought there, but as we already indicated this is a remarkably large amount.

Among the new items of the sixth edition are new tension tests amplifying the discussion of exponential stress-strain formulas in place of the rectilinear law of Hooke; a new tension grip for stone tensile test-pieces; tensile tests of steel after various heat treatments; discussion of secondary flexure of channels; tests of cast-iron angle-pieces to determine the weakening effect of re-entrant angles with large and small fillets; etc. Prof. R. Baumann, like the author a member of the faculty of the Stuttgart Technische Hochschule, assisted in preparing this edition. The book appears with excellent topography and general make-up; that the cuts are given without titles is a little disturbing factor that may always be looked for in a German treatise.

METALLURGY OF TIN.—By Henry Louis, M. A., D. Sc., A. R. S. M.; Professor of Mining, and William Cochrane, Lecturer on Metallurgy at Armstrong College, University of Durham; Author of "A Handbook of Gold Milling," etc. New York and London: McGraw-Hill Book Co. Cloth; 6 × 9¼ ins.; pp. 138; 41 text figures; $2, net.

Anyone interested in the properties and occurrence of tin and various alloys, as well as in the metallurgy should read this little volume. The author has given many examples of primitive smelting processes as well as the most modern shaft and reverberatory practice. A chapter is added on the manufacture of tin plate and the recovery of tin from scrap plate.

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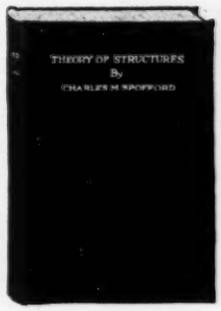

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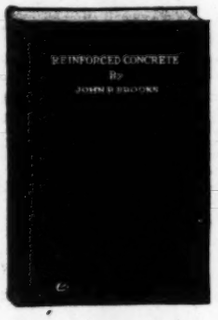

Reinforced Concrete

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The author wrote with a regard for the needs of the engineer in practice as well as the teacher and student.

Practical Thermodynamics

By FORREST E. CARDULLO, M. E.,
Professor of Mechanical Engineering, New Hampshire College.
414 pp.; 6 × 9; over 200 illustrations; $3.50 (15s.) net, postpaid.

The theory and design of heat engines, refrigerating machinery, and other power-plant apparatus.

It is noteworthy for its simplicity of statement, logical treatment, and the new material in many sections. The chapters on the flow of gases, entropy, losses, cooling-towers, gas-producers, and the kinetic theory as applied to liquids and imperfect gases are especially distinctive.

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Harrington's Practical Hygiene Revised.

A MANUAL OF PRACTICAL HYGIENE.—For Students, Physicians and Health Officers. By Charles Harrington, M. D., Late Professor of Hygiene in the Medical School of Harvard University. Fourth Edition, revised and enlarged. By Mark Wyman Richardson, M. D., Secretary to the State Board of Health of Massachusetts. Philadelphia and New York: Lea & Febiger. Cloth; 6 x 9¼ ins.; pp. 850; 12 plates and 124 text figures. $4.50, net.

The second and third editions of this work were favorably noticed in our issues of Sept. 17, 1903, and Sept. 14, 1905, respectively. The death of Professor Harrington in 1908 (which we should describe as unfortunate rather than "unexpected") has brought to the revision begun by Prof. Harrington the able efforts of Dr. Richardson, who succeeded Prof. Harrington as Secretary of the Massachusetts State Board of Health. In revising the chapter on Sewage Disposal assistance was rendered by Mr. H. W. Clark, Chemist of the Massachusetts State Board of Health.

The volume continues to be an encyclopedia of nearly every phase of personal and public hygiene, with the addition of considerable information on general and municipal sanitation—if a distinction can be drawn between hygiene and sanitation. A fairly close examination of its 850 pages leads us to conclude that the revision has been conscientiously and on the whole thoroughly done, and that such faults of omission or commission as the volume contains are chiefly due to the inherent difficulties of producing a one-man encyclopedia of a subject having so many and so complex ramifications as has Hygiene, especially when treated on such an all-inclusive basis as has here been employed.

The brief chapter on "Disposal of Garbage" (four pages) is perhaps the least satisfactory in the volume; not merely because of its brevity, although it seems disproportionately short in comparison with some other topics, but also and chiefly because it is out of date in parts, contains slight inaccuracies and misleading statements and fails to give a true picture of the art and science. The wonder is, though, that in covering so many little-related topics as are treated in this book any one man could have epitomized the literature of the subject as accurately as Prof. Harrington appeared to do in most cases. It is perhaps significant that the chapter on garbage is entirely lacking in the bibliographical references which are so notable a feature of many of the other chapters. While our own belief is that garbage disposal is a matter of municipal cleansing, with relatively slight hygienic importance, the book does not lay stress on that point, so we can only conclude that from the viewpoint of the plan and scope of the volume and attitude of the author and reviser this chapter was faulty at the outset and has been singularly overlooked in the revision.

For those who wish the maximum amount of data on hygiene and sanitation compressed between two covers this volume continues to be unsurpassed among American books. Its value would be enhanced at many points by increasing the amount of critical comment on and weighing and interpretation of the many and sometimes conflicting data which are presented. Then, too, the book utterly lacks general introduction or final summary, beginning with "Foods may be said to include," etc., and ending with "Commonly, the body [in cremation] inclosed in a simple wooden coffin, is placed in the retort," etc. Finally, ought not so large a work on "Practical Hygiene" to have something to say about the administrative side of health-protective work?

THE SEPTIC TANK.—By H. D. Wyllie, C. E., Manager, Cameron Septic Tank Co., Chicago, Ill. Paper; 5¼ x 7¾ ins.; pp. 30. Address The Author.

This pamphlet is virtually a trade publication, but it seems to deserve notice here since it presents one side of the long-continued legal controversy which has taken place in this country over the Cameron patent on the septic tank.

It may be stated for the benefit of those who are unaware of the fact that although the process claims of the Cameron patent were established by the United States Courts some years ago, there is still unsettled litigation, owing to the raising of the question as to whether or not the patent runs the usual full 17 years or was terminated with the earlier British patent. Mr. Wyllie contends that the patent runs the full 17 years and cites evidence which he believes is conclusive on that point. The matter will not be settled, however, until it is finally ruled upon by the highest United States court.

VANISHED ARIZONA.—Recollections of the Army Life of a New England Woman. By Martha Summerhayes. Salem, Mass.: The Salem Press Co. Second edition. Cloth; 5 x 8 ins.; pp. 319; 28 illustrations. $1.60, postpaid.

The author of this interesting volume "joined the army" in 1874 on becoming the wife of a second lieutenant of the Eighth Regiment, then stationed at Fort Russell, Cheyenne, Wyoming Territory. Very soon after, Lieut. Summerhayes was ordered to an unknown post in Arizona. There being no railway available, the choice of route was between an overland passage by wagons and a trip by rail to San Francisco and thence by boat through the Gulf of California up the Colorado River and then by wagon to the unknown destination. The latter route was the one taken. The volume gives some of the most striking details of this journey and of wanderings from army post to army post in Arizona and elsewhere in the West and Southwest, until after many years Mrs. Summerhayes' husband had been materially advanced in rank and was located successively in New York and in Washington and finally placed on the retired list.

The book is full of interest from cover to cover, but particularly so in its earlier half or two-thirds, which is devoted largely to Arizona in its pre-settlement and pre-railway days.

MILWAUKEE BUREAU OF ECONOMY AND EFFICIENCY.—John R. Commons, Director. Milwaukee, Wis.: The Bureau. Paper; 6 x 9 ins.
Bulletin No. 1: Plan and Methods in Municipal Efficiency. By B. M. Rastall. Pp. 29.
Bulletin No. 2: Proposed Consolidation of Fire and Police Alarm Telegraph Systems. By J. E. Treleven. Prepared under the direction of B. M. Rastall. Pp. 23.
Bulletin No. 5: The Refuse Incinerator. By M. Cerf, Louis E. Reber, E. B. Norris, S. A. Greeley. Prepared under the direction of B. M. Rastall. Pp. 75.

The city of Milwaukee under its Socialist administration has entered upon a line of work which is in many respects unique and goes beyond anything previously attempted by an American city. Perhaps we cannot better give a general idea of the work which we have thus characterized than by quoting from the first of the abovementioned pamphlets, as follows:

The Milwaukee Bureau of Economy and Efficiency is engaged in a municipal survey along the lines of the Pittsburgh Survey and the activities of bureaus of municipal research of other cities, but is of broader scope than either. This survey has two principal sections, the first, a study of the social and economic conditions within the city; the second, a study of the economy and efficiency of municipal departments.

The social survey inquires widely into the conditions of living within the city. Studies are being made of health and sanitary problems, housing conditions, accidents to workmen, standards of living, and kindred subjects, and definite plans will be proposed for the advance of the city to the best social conditions. The survey of business efficiency inquires into the organization, administration, accounting, finance, business practice, construction and operation work performed by the various departments of the city government, and will work out economical and efficient business systems for these departments.

Beyond its work for the city departments, the bureau seeks to become a part of the general movement for the advance of the city along material and social lines, and cooperates to this end wherever possible with local business, industrial, civic, and social organizations and with state and national organizations of similar character.

The remainder of Bulletin 1 consists of a more detailed explanation of the plans and methods of the bureau. From one of the later bulletins it appears that aside from Profs. John R. Commons and B. M. Rastall, as Director and Associate Director, the bureau has organized a staff of consulting experts consisting of two men each on organization, engineering, accounting, health and sanitation, finance and taxation and one man on social survey. Profs. F. E. Turneaure and Louis E. Reber, of the University of Wisconsin, are experts on engineering; Profs. H. L. Russell and W. T. Sedgwick, of the University of Wisconsin and Massachusetts Institute of Technology, respectively, are experts on sanitation.

Bulletin No. 2 on Alarm Telegraph Systems sets forth in some detail why the bureau recommends a consolidation of construction and maintenance work and various other changes designed for increased economy and efficiency.

Bulletin No. 3 on the city refuse incinerator is a thoroughgoing and valuable study which contains recommendations for effecting estimated

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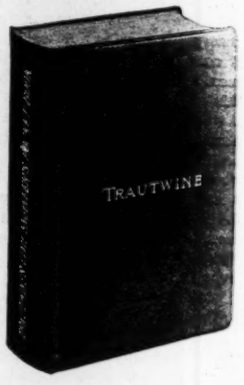

In its First Edition, printed 1871, "Trautwine" represented more than forty years of experience on the part of its author, one of the leading civil engineers of his day, an industrious and intelligent observer, and a master in the art of making the English language express facts in few words and with the utmost lucidity.

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annual savings of $64,000. Recommendations promising to save over $16,000 had already been put into effect when the report was made. To realize the full estimated savings, it will be necessary to install plants for utilizing clinker and steam.

This bulletin contains a large amount of information in the way of analyses of the cost of handling rubbish and ashes at the incinerator and also in the shape of detailed directions for the future operation and improvement of the incinerator with a view to increased efficiency. The bureau acknowledges the hearty cooperation of Mr. S. A. Greeley, Jr. M. Am. Soc. C. E., Superintendent of the Incinerator.

How to Give Every Voter a Representative in Legislative Bodies.

PROPORTIONAL REPRESENTATION.—A Study in Methods of Election. By John H. Humphreys, Hon. Secy., Proportional Representation Society. With an Introduction by The Rt. Hon. Lord Courtney of Penwith. London: Methuen & Co., Ltd. (36 Essex St., W. C.) Cloth; 5 × 7¾ ins.; pp. 400. 5s., net; American price, $2, net.

There is a rapidly increasing volume of public opinion to the effect that the systems of election now commonly prevailing work great injustice to a large number of voters in that under those systems large minorities and sometimes considerable majorities of voters are deprived of representation.

The author of the book before us presents what he considers to be the gross injustice of this system of election and offers numerous illustrations both of voting results and of legislative and other evils which have flowed therefrom. He takes as a brief but forcible description of an ideal system the following sentences from John Stuart Mill's "Representative Government":

> In a really equal democracy any and every section would be represented, not disproportionately, but proportionately. A majority of the electors would always have a majority of the representatives; but a minority of electors would always have a minority of the representatives. Man for man, they would be as fully represented as the majority.

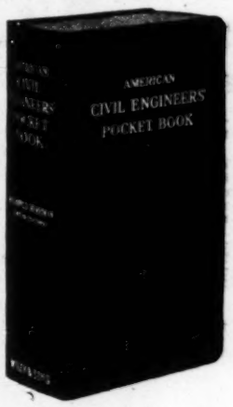
The argument and examples presented by the author are primarily British, but he ranges over the whole world for illustrations to show both the injustice of the ordinary system of representation and the methods which have been proposed and adopted as a remedy. He also reviews the objections which have been urged against proportional representation and presents facts or opinions which show to his satisfaction that few, if any, of the objections are well grounded.

As has already been intimated, the idea of proportional representation is to ensure that any one or more minority parties in a commonwealth or city have due representation in legislative bodies. A second ballot or secondary election, held whenever one or more candidates fail to receive the majority of votes, remedies some but not all of the evils in question. Cumulative voting, under which each voter may take his choice between voting for each of a number of candidates or concentrating his votes on one or more candidates, fails to meet the situation, in the opinion of the author.

What Mr. Humphreys advocates is "the single transferable vote" or "preferential voting." Under this system, each voter indicates first, second and third, etc., choice against the names of as many candidates as there are offices to be filled, and means are provided for transferring his vote as many times as may be necessary to carry out the system.

A considerable portion of the volume is devoted to an explanation of various systems which have been devised for the distributing of votes which have to be transferred. The author even goes so far as to present diagrams to show arrangements for counting the votes, seating election officers, etc. A number of appendixes are used to describe in detail the electoral systems of a number of countries.

The author seems to have covered his subject in a very comprehensive manner, unless it be in



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the presentation of objections to proportional representation. This, as we have already stated, he discusses at some length, but he raises questions against the system only to answer them. Nevertheless, we think that any one not blinded by rigid devotion to precedent or to party systems would be convinced on reading this book that the author has made a very strong case for proportional representation and that by one means or another it is inevitable that some system of minority representation will prevail throughout the world before many decades have elapsed.

Delays in the issuance of the bulletins of the U. S. Bureau of Labor (Washington, D. C.) have brought to us almost at the same time three every-other-month issues, each of which contains matter of possible interest to the large and varied classes of readers of this journal.

German experience with industrial accidents from 1897 to 1907, with particular reference to the loss of earning power of the sufferers, is reviewed in the Bulletin for January, 1911. This contains also a review of workmen's compensation and insurance legislation, 1911, being confined to the United States. The March number of the same bulletin contains a statistical review of wholesale prices from 1890-1910; also studies of the cost of living in Great Britain, Germany, France, Belgium and the United States, based on an inquiry made by the British Board of Trade. The May Bulletin contains a lengthy "Fourth Report on Hawaii."

A "Sailing Dates Bulletin," giving a list of dates of sailing from all the principal ports of the United States, is to be issued as a monthly bulletin by the U. S. Department of Commerce and Labor, Washington, D. C., beginning with September. It is expected that the bulletin will cover at least 2,000 sailings. Single copies will be supplied free to parties reasonably entitled to it on addressing the Bureau of Statistics, Department of Commerce and Labor, Washington, D. C. The bulletin will also be supplied in quantities to one address, at a nominal charge, by the Superintendent of Documents, Washington, D. C.

"American Conservation," first published early in the present year, is to be discontinued by the National Conservation Association, according to an announcement in the August number. The reason assigned is that the journal named "absorbs time and energy needed for the practical constructive work" of those engaged in the work of the Association. "American Forestry," which is the official organ of the American Forestry Association, will inherit the unexpired subscriptions to "American Conservation."

The rules of the National Board of Fire Underwriters (135 William St., New York City) for the construction and installation of centrifugal fire pumps, fire-signal systems and municipal fire-alarm systems, as recommended by the National Fire Protection Association, have just been issued in revised form. The rules relating to signaling and to municipal fire-alarm systems cover use as well as construction and installation. The pamphlet on centrifugal fire pumps contains a statement to the effect that specifications which it contains are now used throughout the entire country, having been adopted by the Associated Factory Mutual Fire Insurance Co. and the National Fire Protection Association.

FARMERS' BULLETINS, U. S. DEPARTMENT OF AGRICULTURE.—Bureau of Entomology; L. O. Howard, Ph. D., Chief. Washington, D. C.: Pub. Docs. Paper; 6 x 9 ins.
No. 459: House Flies. By L. O. Howard. Pp. 16; 9 text figures.
No. 444: Remedies and Preventives Against Mosquitoes. By L. O. Howard. Pp. 15.

Of these two pamphlets the one devoted to "House Flies" is directed more particularly to means of identification and of prevention, while the one on Mosquitoes is chiefly concerned with dealing with mosquitoes when on the war path, although the mosquito bulletin does contain useful suggestions for the abolition of breeding places and the destruction of larvae. Each of the bulletins is eminently practical. If well followed the suggestions made would go far towards eliminating these two pests and enemies of mankind, or at least toward bringing them within a degree of "reasonable" control which would meet the approval of the U. S. Supreme Court.

Publications Received.

AVIATION AGENDA.—Formulaire de l'Aviateur. Publié sous la direction de R. Desmons, Ingénieur-conseil, Directeur de "L'Aéronaute," Secrétaire de la Société Francaise de Navigation aérienne, Chef du tracé de la Carte Aéronautique de France. Paris: Aviation-Agenda (127 Boulevard St.-Michel). Paper; 3½ x 7 ins.; pp. 365; many text illustrations. Francs 2.25; American price, 70 cts., net.

BETRACHTUNGEN UEBER FAHRTEN UND HAVARIEN DER ZEPPELIN-LUFTKREUZER.—Sowie Vorschläge zum Bau und Betrieb von Motor-Luftschiffen starren Systems. By Franz Lönholdt, Architekt. Frankfurt am Main: Druck und Verlag von Bebrüder Knauer. Stiff paper; 6 x 9 ins.; pp. 36; 7 text figures. Pfennige, 80; American price, 32 cts., net.

COMMISSIONER OF PUBLIC ROADS (New Jersey).—Report for 1910. Paterson, N. J.: State Doc. Cloth; 6 x 9 ins.; pp. 167; 1 map; illustrated.

THE CONTRIBUTION OF THE MINING PROFESSION TO THE CONSERVATION OF OUR NATURAL RESOURCES.—An address delivered by Henry Sturgis Drinker, LL. D., at the Exercises commemorating the Twenty-Fifth Anniversary of the Michigan College of Mines, Houghton, Mich. Paper; 6 x 9¼ ins.; pp. 19.

HANDBUCH DER HYGIENE.—Herausgegeben von Prof. Dr. M. Rubner (Berlin), Prof. Dr. M. v. Gruber (Munich) and Prof. Dr. M. Ficker (Berlin). 11. Band, 2. Abteilung; Wasser und Abwasser. Leipzig: Verlag von S. Hirzel. Paper; 7 x 10¼ ins.; pp. 410; 3 colored plates and 111 text illustrations. 15 marks (Halbfranz, 18 marks); American price, $6, net.

LAMPS AND SHADES IN METAL AND ART GLASS.—By John D. Adams, Author of "Arts-Crafts Lamps—How to Make Them." Chicago: Popular Mechanics Co. Cloth; 5 x 7 ins.; pp. 114; illustrated with 18 complete designs with working drawings and full directions for their making. Price, 50 cts.

LA PANTACHYMETRIE ET LES INSTRUMENTS.—Pour l'arpentage rapide des terrains. By Prof. N. Vrsalovitch. Belgrade, Servia: L'imprimerie Sv. Sava. Vuk. Karadgitch, No. 22-24. Boards; 5 x 7½ ins.; pp. 94; 25 text figures and five tables. Francs 2; American price, 60 cts., net.

A MANUAL OF PRACTICAL HYGIENE.—For Students, Physicians and Health Officers. By Charles Harrington, M. D., Late Professor of Hygiene in the Medical School of Harvard University. Fourth Edition, revised and enlarged. By Mark Wyman Richardson, M. D., Secretary to the State Board of Health of Massachusetts. Philadelphia and New York: Lea & Febiger. Cloth; 6 x 9¼ ins.; pp. 850; 12 plates and 124 text figures. $4.50, net.

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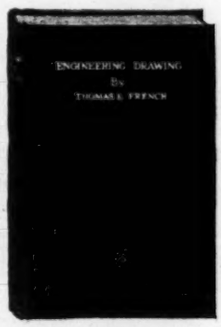

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